

Question

Find the complementary function for the equation:

$$\frac{d^2x}{dt^2} + 3\frac{dx}{dt} + 2x = 1 + 2t + t^2$$

Answer

The complementary function for $\frac{d^2x}{dt^2} + 3\frac{dx}{dt} + 2x = 1 + 2t + t^2$

Is solution of $\frac{d^2x}{dt^2} + 3\frac{dx}{dt} + 2x = 0$

Auxiliary equation is $m^2 + 3m + 2 = (m + 2)(m + 1) = 0 \Rightarrow m = -2, -1$

Hence

$$x_c = Ae^{-2t} + Be^{-t}$$

with A, B arbitrary constants.